

What is claimed is:

1. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a case having a first surface and a second surface in mutual opposition, the first surface being open;

a first cover for covering the first surface;

a partitioning wall for separating the interior of the case into a first chamber and a second chamber, respectively, for holding the ink;

a porous material accommodated in the first chamber;

an ink filling hole formed in the first cover for filling the first chamber and the second chamber with ink; and

a pressure reduction hole formed in the first cover and connected to a reduced pressure source for reducing the pressure in the first chamber and the second chamber, wherein the first chamber and the second chamber are connected near the second surface inside the case.

2. The ink cartridge according to claim 1, wherein an ink supply hole for supplying ink from the first chamber or

the second chamber to the recording head is formed in the second surface of the case.

3. The ink cartridge according to claim 2, wherein the second surface is also open, a second cover is provided for covering the second surface, and the ink supply hole is formed in the second cover.

4. The ink cartridge according to claim 3, wherein an atmosphere connection hole for communicating with the first chamber is formed in the second cover.

5. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a case having a first surface and a second surface in mutual opposition and containing ink therein; wherein:

an ink filling hole for filling the case with ink and a pressure reduction hole connected to a reduced pressure source for reducing the pressure inside the case are formed in the first surface;

an ink supply hole for supplying ink to the recording head is formed in the second surface;

the ink filling hole and the pressure reduction hole are closed off by a first sealing material applied to the first surface; and

the ink supply hole is closed off by a second sealing material applied to the second surface so that the second sealing material can be peeled away.

6. The ink cartridge according to claim 5, wherein an atmosphere connection hole for communicating between the inside and outside of the case is formed in the second surface, and the atmosphere connection hole is blocked off by a second sealing material that can be peeled away.

7. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a case having a first surface and a second surface in mutual opposition, the second surface being open;

a partitioning wall for separating the interior of the case into an ink chamber for holding ink and an atmosphere connection chamber, wherein the ink chamber and the atmosphere connection chamber are open on the second surface side, one end of the atmosphere connection chamber communicates to the ink chamber on the first surface side,

and the other end of the atmosphere connection chamber communicates to the outside of the case; and

a cover for covering the second surface, the cover having an ink supply hole formed therein, which supplies ink to the recording head and is connected to the ink chamber.

8. The ink cartridge according to claim 7, wherein the cover covers the open surfaces of the ink chamber and the atmosphere connection path, and has a second connecting hole for communicating with the atmosphere connection path.

9. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a case having a first surface and a second surface in opposition, the first and second surfaces are open;

a partitioning wall for separating the interior of the case into an ink chamber for holding ink and an atmosphere connection path communicating to the outside of the case, wherein the ink chamber is open on the first surface and the second surface sides;

a first cover for covering the first surface of the case so that a path is formed for communicating between the ink chamber and the atmosphere connection path;

a second cover for covering the second surface of the case; and

an ink supply hole joined to the recording head, formed in the second cover so as to communicate with the ink chamber.

10. The ink cartridge according to claim 9, further comprising a second partitioning wall for dividing the ink chamber into a first chamber for accommodating a porous material absorbing ink and a second chamber holding ink, wherein one of the first chamber and the second chamber is covered by the first cover and the other of the chambers is covered by the second cover.

11. The ink cartridge according to claim 10, wherein the first chamber communicates with the atmosphere connection path near the first surface, and communicates with the second chamber near the second surface, and the second chamber communicates with the ink supply hole.

12. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a cartridge case having a first side wall and second side wall opposed to the first side wall;

a first partitioning wall positioned substantially parallel to the first side wall of the case so as to separate the interior of the cartridge case into a first chamber and a second chamber for respectively accommodating ink; and

a second partitioning wall positioned substantially parallel to the first side wall of the case for separating the interior of the case into a first chamber and an atmosphere connection path for communicating with an atmosphere outside the case; wherein:

one end of the second chamber communicates with one end of the first chamber;

the other end of the second chamber is open to the outside of the case as an ink supply hole;

one end of the atmosphere connection path communicates with the other end of the first chamber; and

the other end of the atmosphere connection path is open to the outside of the case.

13. The ink cartridge according to claim 12, wherein the atmosphere connection path is divided between the first side wall and the second partitioning wall, and the second chamber is divided between the second side wall and the first partitioning wall.

14. The ink cartridge according to claim 12, wherein there is an ink supply hole for supplying ink to the recording head located near one end of the second chamber, and the ink in the first chamber passes through the second chamber and is supplied to the recording head from the ink supply hole.

15. The ink cartridge according to claim 14, wherein the other end of the first chamber is open, the open part is covered by a first cover, the one end of the second chamber is open, the open part is covered by a second cover, and the ink supply hole is formed in the second cover.

16. The ink cartridge according to claim 13, further comprising, inside the case, a third partitioning wall that is joined to the lower ends of the first partitioning wall and the second partitioning wall while extending in a direction substantially perpendicular to the first side wall, wherein the first chamber is divided by the second and third partitioning walls, and a connecting hole for connecting the first and second chambers is formed in the third partitioning wall.

17. The ink cartridge according to claim 16, wherein the other end of the first chamber is open, the open part is

covered by the first cover, an ink filling hole for connecting the second chamber and the outside of the case is formed in the first cover, the one end of the second chamber is open, the open part is covered by the second cover, and an atmosphere connection hole for communicating with the atmosphere connection hole is formed in the second cover.

18. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a cartridge case having an upper case surface and a lower case surface;

a partitioning wall for dividing the inside of the case into first and second chambers for accommodating ink, respectively, wherein the first and second chambers mutually communicate near the lower case surface;

an ink filling hole for filling the second chamber with ink, formed in the upper case surface;

a sealing material for closing off the ink filling hole;

an ink supply hole for supplying ink to the recording head from the second chamber, formed in the lower case surface; and



an atmosphere connection hole for connecting the first chamber to an atmosphere outside of the cartridge, wherein:

the second chamber is formed between one side wall of the case and the partitioning wall; and

at least one portion of the one side wall is transparent or semi-transparent.

19. The ink cartridge according to claim 18, wherein The first chamber has a larger capacity than the second chamber and accommodates a porous material absorbing ink.

20. The ink cartridge according to claim 19, wherein the upper case surface is configured by a cover attached to the case, and the ink filling hole is formed in the cover.

21. The ink cartridge according to claim 18, wherein an inner surface of the transparent or semi-transparent part of the one side wall has undulating ribs extending vertically up and down.

22. An ink cartridge removably attached to a recording head wherein the remaining ink quantity inside the cartridge is detected by an optical detector having a light emitting component and a light receiving component, comprising:

a cartridge case having in its interior an ink chamber for holding ink; and

a remaining ink quantity detection site provided on the case; wherein:

the inner case surface at the detection site has undulating ribs extending in a direction perpendicular to a plane containing the detection-light light emitting component, the light receiving component, and the detection site; and

the remaining ink quantity inside the ink chamber is detected by illuminating a light to the detection site, and receiving the light that is reflected therefrom.

23. The ink cartridge according to claim 22, wherein the outer surface of the case at the detection site has undulating ribs extending parallel to the plane containing the light emitting component, the light receiving component, and the detection site.

24. The ink cartridge according to claim 22, wherein the case having the undulating ribs is molded using a die.

25. The ink cartridge according to claim 23, wherein the case containing the undulating ribs on the outer surface of the case is molded using a die.

26. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a cartridge case having an upper case surface and a lower case surface;

a partitioning wall for separating the interior of the cartridge case into a first chamber for holding ink and an atmosphere connection chamber for communicating with an atmosphere outside the case, one end of the wall is joined to the upper case surface; and

a path for connecting the first chamber and the atmosphere connection chamber, formed in the upper case surface; wherein:

the path and the first chamber are connected via a portion of a surface which does not contain an intersection line formed by the intersection of a surface and a surface.

27. The ink cartridge according to claim 26, wherein a porous material absorbing ink is accommodated in the first chamber, a projecting part that projects to the inside of the first chamber is formed on the upper surface of the case, at a position apart from the partitioning wall, and the projecting part pushes against the porous material in the first chamber.

28. The ink cartridge according to claim 26, wherein the path is formed by a concavity in the outside surface of the upper surface of the case, extending from the first chamber to the atmosphere connection chamber, a first hole connecting the concavity and the first chamber, a second hole connecting the concavity and the atmosphere connection chamber, and sealing material covering the concavity.

29. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a cartridge case having an upper surface and a lower surface; and

a partitioning wall for dividing the interior of the case into an ink chamber for holding ink and an atmosphere connection path for communicating to the ink chamber and also communicating to an atmosphere outside the case; wherein:

the atmosphere connection path extends from the lower surface of the case to the upper surface thereof;

a part of the inner wall of the lower surface of the case projects into the atmosphere connection path inside the case; and

a connecting hole is passed through the projecting part for communicating between the outside of the case and the atmosphere connection path, whereby ink can be accumulated in the atmosphere connection path inside the case.

30. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a cartridge case having an upper case surface and a lower case surface;

a partitioning wall for dividing the inside of the cartridge case into a first chamber for accommodating porous material absorbing ink and a second chamber for holding ink, wherein the partitioning wall has a first part that is in opposition to the lower surface of the case, whereby a portion of the second chamber exists between the partitioning wall and the lower case surface, and a connecting hole for connecting the first chamber and the second chamber is formed in the first part of the partitioning wall;

an ink supply hole, formed in the lower case surface, for supplying ink from the second chamber to the recording head; and

a baffle plate, provided between the connecting hole and the ink supply hole, for preventing air bubbles

from flowing into the ink supply hole from the connecting hole.

31. The ink cartridge according to claim 30, wherein the lower case surface is a cover member which is installed on the case when the ink cartridge is manufactured, the ink supply hole is formed in the cover member, and the baffle plate is formed on at least one of the cover member and the partitioning wall.

32. The ink cartridge according to claim 31, wherein the partitioning wall has a second part extending from the end of the first part thereof toward the upper case surface, and the second chamber is divided between the first and second partitioning walls and the inner walls of the case.

33. The ink cartridge according to claim 32, wherein the part of the partitioning wall that is the first part thereof and that reaches the second part from a connecting hole is inclined toward the upper case surface.

34. An ink cartridge removably attached to a recording head for holding ink supplied to the recording head, comprising:

a cartridge case; and

a partitioning wall for dividing the inside of the cartridge case into an ink chamber for holding ink and an empty chamber that communicates to the outside of the case;

wherein the ink chamber and the empty chamber do not mutually communicate.

35. The ink cartridge according to claim 34, wherein the cartridge case is configured of a main case body, one end of which is open, and a cover member for covering the open part of the main case body, wherein the empty chamber is formed by the cover member and the partitioning wall, and a hole is provided in the cover member for connecting the empty chamber to the outside of the case.

36. The ink cartridge according to claim 34, further comprising a bag for hermetically sealing the ink cartridge, wherein the ink cartridge is accommodated inside the bag under reduced pressure, and the empty chamber promotes the preservation of the reduced pressure condition inside the bag.

37. The ink cartridge according to claim 35, wherein the ink chamber has a first chamber for accommodating a porous material absorbing ink and a second chamber for holding ink and for communicating via a connecting hole to the first chamber, wherein the second chamber is covered by

the cover member, an ink supply hole for providing ink from the second chamber to the recording head is formed in the cover member, and the empty chamber is formed adjacent to the second chamber.

38. The ink cartridge according to claim 35, wherein the partitioning wall also divides the inside of the case between the ink chamber and an atmosphere connection path, one end of the atmosphere connection path communicates with the ink chamber, the other end thereof communicates with an atmosphere outside the case, a connecting hole is formed in the cover member for connecting the atmosphere connection path to the atmosphere, and the empty chamber is formed adjacent to the atmosphere connection path.

39. The ink cartridge according to claim 38, wherein an ink supply hole for guiding ink from the ink chamber to the recording head is formed in the cover member, the ink supply hole and atmosphere connection hole are closed off by sealing material that can be peeled away, the cartridge case is sealed inside a bag under reduced pressure, and the empty chamber promotes the preservation of the reduced pressure condition inside the bag.



40. A remaining ink quantity detection method for detecting the remaining quantity of ink in an ink cartridge having a case divided by a plurality of wall surfaces the interior of which is filled with ink, comprising the steps of:

directing a detection light onto a ridge part that is formed by the intersection of at least two side surfaces which extend vertically up and down in the case and that extends vertically up and down; and

detecting a light reflected from the ridge part.

41. The remaining ink quantity detection method according to claim 40, wherein the remaining ink quantity is detected using an optical sensor, and the optical sensor is positioned facing the ridge line part.

42. The remaining ink quantity detection method according to claim 41, wherein the ridge line part is made of a transparent or semi-transparent material, and the sensor has a light emitting component and a light receiving component provided facing the ridge line part.

43. The remaining ink quantity detection method according to claim 40, wherein the case comprises a first chamber that communicates with an atmosphere outside of the

cartridge and accommodates a porous material absorbing ink, and a second chamber that communicates with the first chamber and holds ink, the upper part of which is sealed, and the ridge line part exists on the second chamber.

44. The remaining ink quantity detection method according to claim 40, wherein the ink cartridge further comprises:

a partitioning wall for dividing the inside of the case into a first chamber and a second chamber for holding ink, at least a part of a wall surface of which second chamber is transparent or semi-transparent;

a connecting hole for mutually communicating between the first chamber and the second chamber;

an ink filling hole, formed at the upper end of the second chamber, for filling the first chamber with ink from the second chamber via the connecting hole;

a sealing member for closing off the ink filling hole; an ink supply hole, formed at the lower end of the second chamber, for supplying ink to the recording head; and

an atmosphere connection hole for connecting the first chamber to an atmosphere outside of the cartridge.

45. The remaining ink quantity detection method according to claim 42, wherein the inner surface of the case

at the ridge line part has undulating ribs extending in a direction perpendicular to the plane containing the light emitting component and light receiving component of the optical sensor and the ridge line part.